REMARKS

Applicant appreciates the thorough examination of the present application that is reflected in the Official Action of November 12, 2003. In response, the claims have been amended extensively to provide proper antecedent basis and eliminate any potential confusion by the shorthand notation that was used in the original claims. Applicant respectfully submits that the pending claims are patentable over Cheng et al. for the reasons that now will be described. For the convenience of the Examiner, the remarks below will follow the order in which objections and rejections were presented in the Detailed Action.

The Specification

The Examiner asserts that the title of the invention is not descriptive and is too long. However, the title of the invention is:

> DEFERRED INDEX BUILDING SYSTEMS, METHODS AND COMPUTER PROGRAM PRODUCTS FOR STORING TEMPORALLY SPACED APART BURSTS OF DATA RECORDS IN A DATABASE.

Applicant respectfully submits that this title precisely describes the claimed invention, because the claims are directed to systems, methods and computer program products, and are directed to deferred index building for storing temporally spaced apart bursts of data records in a database. See, for example, Claim 1, which states as follows:

> 1. A method of storing temporally spaced apart bursts of data records in a database, comprising:
>
> deferring building an index for a plurality of data records in a respective burst until after storing the plurality of data records in the respective burst in the database.

Applicant also respectfully refers the Examiner to U.S. Patent 5,204,958 to Cheng et al., which was cited in rejecting all of the claims. The title of Cheng et al. is:

> SYSTEM AND METHOD FOR EFFICIENTLY INDEXING AND STORING A LARGE DATABASE WITH HIGH DATA INSERTION FREQUENCY.

Applicant respectfully submits that this is consistent with the title of the present invention.

However, in order to expedite the present application to allowance, Applicant would be amenable to amending the title to state:

> DEFERRED INDEX BUILDING SYSTEMS, METHODS AND COMPUTER PROGRAM PRODUCTS.

If the rejection of the title is the sole remaining issue in the present application, Applicant hereby consents to the Examiner's amending the title as stated above by Examiner's

Amendment. Alternatively, Applicant encourages the Examiner to contact the undersigned to arrive at a title which is shorter but which is clearly indicative of the invention to which the claims are directed.

Claim Objections

Claims 4-5, 17-18, 24-25, 31-32, 36, 38-39 and 42 are objected to under 37 CFR §1.75(c), as being of improper dependent form for failing to further limit the subject matter of the previous claim. However, Applicant respectfully disagrees for the reasons that now will be described.

In particular, as to Claims 4 and 5, these claims depend from Claim 3. Claim 3 recites:

> beginning to build the index for a corresponding one of the spaced apart bursts after expiration of the corresponding one of the series of spaced apart time intervals.

Thus, Claim 3 recites beginning to build the index. In contrast, Claim 4 goes beyond beginning to build an index to recite:

> building the index for the corresponding one of the spaced apart bursts after expiration of the corresponding one of the series of spaced apart time intervals. (Emphasis added.)

Thus, the entire index is built in Claim 4 rather than just beginning to build the index in Claim 3. Moreover, Claim 5 recites:

> building the index for the corresponding one of the spaced apart bursts after expiration of the corresponding one of the series of spaced apart time intervals and prior to beginning a next one of the series of spaced apart time intervals. (Emphasis added.)

Thus, Claim 5 recites that the entire index is built in the time interval after expiration of a burst, but prior to beginning the next burst. Accordingly, Claims 4 and 5 do further limit the subject matter of Claim 3. Similar analysis applies to analogous system Claims 17 and 18, 24 and 25, and analogous computer program product Claims 31 and 32, and 38 and 39.

Claims 36 and 42 have been amended to recite that the computer program product further comprises computer-readable program code that is configured to provide the database. In particular, the independent claims from which these claims depend recite a computer program product for storing records in a database, but do not recite the database itself. In contrast, dependent Claims 36 and 42 add the database itself to this combination. Accordingly, these claims also further limit the subject matter claimed by their respective

parent claims. Applicant wishes to note that the amendments that were made to Claims 36 and 42 were made in response to claim objections and for reasons unrelated to patentability. Accordingly, the full range of equivalents is available for these claims.

In view of the above remarks and claim amendments, Applicant respectfully requests withdrawal of the claim objections.

Claim Rejections - 35 USC §112

Claims 1-42 stand rejected under 35 USC §112, second paragraph as allegedly failing to set forth the subject matter which Applicant regards as his invention. As evidence, the Official Action quotes Page 10, lines 15-20 of the present application. However, Applicant wishes to quote for the Examiner the entire passage from which these lines are taken, i.e., Page 10 of the present application, lines 15-28:

> Embodiments of the invention may stem from realizations that when inserting flow records without specifying a key structure, thus building a C-ISAM data file without actually building an index file, the insertion speed can be improved, for example by about 50% on Sun Ultra 10 and Sun 450 servers. Thus, it was realized that it is possible to build a C-ISAM data file during peak data arrival time without building the index file. It also was realized that after completion of building the data file, during an off-peak time, a possibly slower technique may be used to build an index file over all of the newly inserted records in that new data file.
>
> Accordingly, embodiments of the invention can defer building an index for a plurality of records in a respective burst until after storing the plurality of data records in the respective burst in the database. An analogous scenario may be seen in the evolution of cows. To ensure a cow eats the most available food, a cow first swallows food at fast pace without chewing, and stores the food inside its stomach. Later on, the cow ruminates cud at a slower pace. (Emphasis added.)

This passage clearly describes that a realization or inspiration for the present invention may have been arrived at in building a C-ISAM data file, but clearly describes that embodiments of the present invention apply to the storing of temporarily spaced apart bursts of data records in any database by deferring building an index for a plurality of data records in a respective burst until after storing the plurality of data records in a respective burst in a database.

Moreover, Page 3, lines 27-34 of the present application also clearly state that the invention applies to any other database:

> Finally, although systems, methods and/or computer program products according to embodiments of the invention are described herein primarily with regard to C-ISAM databases, they may be used with any other database system that stores temporal data, such as Sybase, marketed by Sybase, Inc.; Oracle, marketed by Oracle Corporation; Ingres marketed by Computer Associates International, Inc. and DB2, marketed by

> IBM Corporation. Improved systems, methods and/or computer program products for storing temporally spaced apart bursts of data records in a database thereby may be provided.
>
> Applicant also wishes to note that Page 4, lines 23-29 of the present application state:
>
> > The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

Accordingly, the claims should not be limited the specific embodiments that are described therein. Finally, Applicant notes that dependent Claims 8, 21 and 35 do claim the ISAM database. For at least these reasons, Applicant respectfully submits that Claims 1-42 set forth the subject matter which Applicant regards as his invention.

In rejecting the claims under 35 USC §112, second paragraph, the Official Action also states at Paragraph 4, Page 3:

> ...and this statement clearly indicates that the invention is different from what is defined in the claim(s) because non [sic] of the claims in the instant application specifies the benefit of building a deferred index as disclosed in the instant specification.

Applicant respectfully submits, however, that the claims in the instant application do not need to specify the "benefit" of building a deferred index. Rather, the claims need to specify systems, methods and/or computer program products that are novel and unobvious over the prior art. Any "benefit" of the claims may be described in the specification, if at all. Moreover, any benefit that is described should not be read into the claims themselves, but may provide an indicia of unobviousness of the present invention. Accordingly, Applicant respectfully requests withdrawal of this rejection under 35 USC §112, second paragraph.

Claims 4-5, 10-11, 17-18, 23-24 and 31-32 also stand rejected under 35 USC §112 as being indefinite because some of the terms allegedly lack antecedent basis. In general, Applicant wishes to point out that the claims as filed used a shorthand notation to provide antecedent basis for earlier recitations. Thus, for example, Claim 1 recites:

> 1. A method of storing temporally spaced apart bursts of data records in a database, comprising:
>
> deferring building an index for a plurality of data records in a respective burst until after storing the plurality of data records in the respective burst in the database. (Emphasis added.)

Claim 2 as originally filed then recited:

> 2. A method according to Claim 1 wherein the deferring comprises: deferring building an index for all the data records in a respective burst until after storing all the data records in the respective burst in the database. (Emphasis added.)

In Claim 2, "the deferring" was meant to provide antecedent basis for the entire recitation of "deferring building an index for a plurality of data records in a respective burst until after storing the plurality of data records in the respective burst in the database". Unfortunately, this shorthand technique for providing antecedent basis may have created confusion. Accordingly, the claims have been amended extensively to include the full recitation from a parent claim in a child claim, to thereby provide complete and consistent antecedent basis. Thus, for example, Claim 2 has been amended to recite:

> 2. A method according to Claim 1 wherein deferring building an index for a plurality of data records in a respective burst until after storing the plurality of data records in the respective burst in the database comprises: deferring building an index for all the data records in a respective burst until after storing all the data records in the respective burst in the database. (Emphasis added.)

Similar amendments have been made for Claims 3-7, 9-20, 22-34 and 36-42. Accordingly, proper antecedent basis is now provided in all of the pending claims.

Finally, Claims 27 and 42 have been amended to recite that the system further comprises a database, to provide a verb.

In view of the above, Applicant respectfully submits that Claims 1-42 are in compliance with 35 USC §112, and respectfully requests withdrawal of the outstanding rejections under 35 USC §112. Applicant also wishes to note that these amendments have been made to provide proper antecedent basis and a verb for the claims, for issues unrelated to patentability. Accordingly, the full range of equivalents is available for the amended claims.

Claim Rejections - 35 USC §102

Claims 1-26 and 28-42 stand rejected under 35 USC §102(e) as being anticipated by U.S. Patent 5,204,958 to Cheng et al. However, Applicant respectfully submits that these claims are patentable for the reasons that will be described below. In particular, independent Claims 1, 14 and 28 are method, system and computer program product analogs of one another. Claim 1 recites:

1. A method of storing temporally spaced apart bursts of data records in a database, comprising:

deferring building an index for a plurality of data records in a respective burst until after storing the plurality of data records in the respective burst in the database.

As noted in the present application, for example at Page 2, line 34-Page 3, line 2:

> Thus, while the data burst is being received, little or no resources may need to be devoted to index building. Rather, index building may begin after termination of a data burst, when more resources may be available.

Cheng et al. relates to deferred index building, but in a different manner and for a different reason. In particular, Cheng et al. relates to *"System and Method for Efficiently Indexing and Storing a Large Database With High Data Insertion Frequency"*, as noted in the Cheng et al. title. As noted in the Cheng et al. Background of the Invention section at Column 2, lines 40-50:

> The present invention overcomes the above described disk I/O bottleneck associated with high frequency data insertion. It enables a computer system to perform high frequency inserts into the indexes of large databases with much less disk arm use, and therefore at much lower cost. In particular, the present invention defers index changes, and handles such updates to the stored log indexes in batches in a predefined order that matches the order in which indexes are stored on disk. As a result, the load imposed on disk devices is greatly reduced.

Thus, Cheng et al. is related to high frequency data insertion. In sharp contrast, Claims 1, 14 and 28 relate to "bursty" data, such as was described in connection with Figure 1 of the present application, wherein "large amounts of data are received during a burst of time and no or relatively small amounts of data are received between the bursts of time" (see the present application, Page 2, lines 17-18).

Moreover, Cheng et al. proposes a solution that is different from that which is recited in Claims 1, 14 and 28. In particular, as noted in Cheng et al.'s Summary of the Invention, Column 2, line 60-Column 3, line 16:

> SUMMARY OF THE INVENTION
>
> In summary, the present invention is a database indexing methodology which allows low cost indexing of databases with very high insertion rates. A database index file is maintained by a computer system having primary random access memory and secondary memory. A record for each item added to the database is stored in a sequential file in secondary memory (disk storage) and an indexed pointer to the new record is stored in a small B-tree stored in primary random access memory. The full index file for the database is a second, large B-tree stored in secondary memory. Leaf-nodes of the full index file are stored in packed, indexed order.
>
> Periodically, a portion of the memory resident small B-tree is merged with a corresponding portion of the large B-tree by selecting a range of index values and

> retrieving from secondary memory all indexed pointers in the selected range of index values. The indexed pointers in the first B-tree in the selected range of index values are merged into the retrieved records, the resulting merged set of indexed pointers are stored in secondary memory in indexed order in a contiguous area of secondary memory at the tail of the large B-tree. As a result, the indexed pointers for newly added database records are written to secondary memory in batches, thereby accessing secondary memory very efficiently.

Accordingly, Cheng et al. uses a system of secondary memory to allow high throughput data to be stored.

However, Cheng et al. does not appear to describe or suggest bursts of data, deferring building an index for a plurality of records in a burst of data or deferring an index until after storing a plurality of data records in the respective burst in the database, as recited in Claims 1, 14 and 28. Accordingly, while Cheng et al. may provide solutions in systems and methods for efficiently indexing and storing a large database with a high data insertion frequency, Cheng et al. does not describe any solution for storing temporarily spaced apart bursts of data records in the database, as recited in Claims 1, 14 and 28.

In view of the above, Applicant respectfully submits that Cheng et al. does not anticipate independent Claims 1, 14 and 28 or the dependent claims that depend therefrom.

Independent Claims 9, 22 and 37 also stand rejected under 35 USC §102(e) in view of Cheng et al. Independent Claims 9, 22 and 37 are method, system and computer program product analogs of one another. Independent Claim 9 recites:

> 9. A method of storing, in a database, temporally spaced apart bursts of data records that are received during a corresponding series of spaced apart time intervals, the method comprising:
>
> storing the spaced apart bursts of data records in the database during the corresponding series of spaced apart time intervals; and
>
> beginning to build the index for a corresponding one of the spaced apart bursts after expiration of the corresponding one of the series of spaced apart time intervals.

As noted above in connection with Claim 1, Cheng et al. does not appear to provide any description or suggestion of storing temporarily spaced apart bursts of data records that are received during a corresponding series of spaced apart time intervals. Nor does Cheng et al. appear to describe or suggest storing the spaced apart bursts of data records in the database during the corresponding series of spaced apart time intervals. Finally, Cheng et al. does not appear to describe or suggest beginning to build the index for a corresponding one of the spaced apart bursts after expiration of the corresponding one of the series of spaced apart

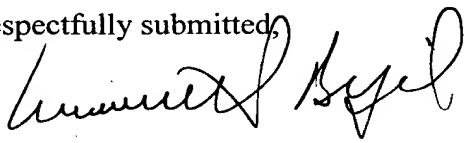
time intervals, as recited in Claim 9. Accordingly, Claims 9, 22 and 37, and the dependent claims that depend therefrom also are patentable over Cheng et al.

Applicant also wishes to note that many of the dependent claims are independently patentable. For example, Claims 3, 16 and 30 are patentable for the same reasons that were described above in connection with Claims 9, 22 and 37. These reasons will not be described again for the sake of brevity.

Conclusion

Applicant has made a sincere effort to address all of the objections and rejections that were made in the detailed Official Action. In light of the above amendments and remarks, Applicant respectfully submits that the above-entitled application is now in condition for allowance. Favorable reconsideration of this application, as amended, is respectfully requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (919) 854-1400.

Respectfully submitted,



Mitchell S. Bigel
Registration No. 29,614
Attorney for Applicants

Customer Number 20792
Myers Bigel Sibley & Sajovec, P.A.
P.O. Box 37428
Raleigh, NC 27627
919-854-1400
919-854-1401 (Fax)

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Non-Fee Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on December 19, 2003.

Susan E. Freedman
Date of Signature: December 19, 2003